WHAT IS CLAIMED IS:

1. A semiconductor apparatus comprising:

a substrate made of a diboride single crystal expressed by a chemical formula XB_2, in which X includes at least one of Ti, Zr, Nb and Hf;

a semiconductor buffer layer formed on a principal surface of the substrate and made of $Al_yGa_{1-y}N$ ($0 < y \leqq 1$); and

a nitride semiconductor layer formed on the semiconductor buffer layer, including at least one kind or plural kinds selected from among 13 group elements and As.

2. A semiconductor apparatus comprising:

a substrate made of a diboride single crystal expressed by a chemical formula XB_2, in which X includes at least one of Ti, Zr, Nb and Hf;

a semiconductor buffer layer formed on a principal surface of the substrate and made of $(AlN)_x(GaN)_{1-x}$ ($0 < x \leqq 1$); and

a nitride semiconductor layer formed on the semiconductor buffer layer, including at least one kind or plural kinds selected from among 13 group elements and As.

3. The semiconductor apparatus of claim 1, wherein the substrate is of ZrB_2 or TiB_2.

4. The semiconductor apparatus of claim 2, wherein the substrate is of ZrB_2 or TiB_2.

5. The semiconductor apparatus of claim 1, wherein the substrate is a solid solution containing one or a plurality of impurity elements of 5 atom % or less, the one or a plurality of impurity elements being selected from a group consisting of Ti, Cr, Hf, V, Ta and Nb when the substrate is of ZrB_2, or selected from a group consisting of Zr, Cr, Hf, V, Ta and Nb when the substrate is of TiB_2.

6. The semiconductor apparatus of claim 2, wherein the substrate is a solid solution containing one or a plurality of impurity elements of 5 atom % or less, the one or a plurality of impurity elements being selected from a group consisting of Ti, Cr, Hf, V, Ta and Nb when the substrate is of ZrB_2, or selected from a group consisting of Zr, Cr, Hf, V, Ta and Nb when the substrate is of TiB_2.

7. The semiconductor apparatus of claim 1, wherein the

semiconductor buffer layer is AlN.

8. The semiconductor apparatus of claim 2, wherein the semiconductor buffer layer is AlN.

9. The semiconductor apparatus of claim 7, wherein the thickness of the semiconductor buffer layer made of AlN is 10 to 250 nm.

10. The semiconductor apparatus of claim 8, wherein the thickness of the semiconductor buffer layer made of AlN is 10 to 250 nm.

11. The semiconductor apparatus of claim 2, wherein the thickness of the semiconductor buffer layer made of $(AlN)_x(GaN)_{1-x}$ is within a range of 10 to 100 nm.

12. The semiconductor apparatus of claim 2, wherein x of the semiconductor buffer layer made of $(AlN)_x(GaN)_{1-x}$ is $0.1 \leqq x \leqq 1$.

13. The semiconductor apparatus of claim 2, wherein x of the semiconductor buffer layer made of $(AlN)_x(GaN)_{1-x}$ is $0.4 \leqq x \leqq 0.6$.

14. The semiconductor apparatus of claim 1, wherein an angle $\theta 1$ formed by a normal line of the principal surface of the substrate and a normal line of the (0001) plane of the substrate is $0° \leqq \theta 1 \leqq 5°$.

15. The semiconductor apparatus of claim 2, wherein an angle $\theta 1$ formed by a normal line of the principal surface of the substrate and a normal line of the (0001) plane of the substrate is $0° \leqq \theta 1 \leqq 5°$.

16. The semiconductor apparatus of claim 7, wherein an angle $\theta 1$ formed by a normal line of the principal surface of the substrate and a normal line of the (0001) plane of the substrate is $0° \leqq \theta 1 \leqq 0.55°$.

17. The semiconductor apparatus of claim 8, wherein an angle $\theta 1$ formed by a normal line of the principal surface of the substrate and a normal line of the (0001) plane of the substrate is $0° \leqq \theta 1 \leqq 0.55°$.

18. The semiconductor apparatus of claim 1, wherein the substrate is eroded and removed by etching.

19. The semiconductor apparatus of claim 2, wherein the substrate is eroded and removed by etching.

20. A method for growing a nitride semiconductor, comprising:

on a substrate of a diboride single crystal expressed by a chemical formula XB_2, in which X includes at least one of Ti, Zr, Nb and Hf, growing $Al_yGa_{1-y}N$ layer ($0 < y \leqq 1$) from vapor phase, and subsequently, growing a nitride semiconductor layer including at least one kind selected from among 13 group elements and As from vapor phase.

21. A method for growing a nitride semiconductor, comprising:

on a substrate of a diboride single crystal expressed by a chemical formula XB_2, in which X includes at least one of Ti, Zr, Nb and Hf, growing an $(AlN)_x(GaN)_{1-x}$ layer ($0 < x \leqq 1$) from vapor phase within a temperature range of more than 400 °C and less than 1100 °C by an MOVPE method, and subsequently, growing a nitride semiconductor layer including at least one kind selected from among 13 group elements and As from vapor phase.

22. The method of claim 21, wherein the thickness of the $(AlN)_x(GaN)_{1-x}$ layer is within a range of 10 to 100 nm.

23. A method for growing a nitride semiconductor, comprising:

on the (0001) plane of a substrate of a diboride single crystal expressed by a chemical formula XB_2, in which X includes at least one of Ti, Zr, Nb and Hf, growing an AlN layer from vapor phase so that a deviation angle of a normal line of a surface of the substrate from a direction of the [0001] becomes 0.55 degrees or less, and subsequently, growing a nitride semiconductor layer including at least one kind selected from among 13 group elements and As from vapor phase.

24. The method of claim 23, wherein the thickness of the AlN layer is within a range of 10 to 250 nm.

25. A method for producing a semiconductor apparatus, comprising:

eroding and removing a diboride single crystal substrate of a semiconductor apparatus obtained by the method for growing nitride semiconductor of claim 21 by etching.

26. A method for producing a semiconductor apparatus, comprising:

eroding and removing a diboride single crystal

substrate of a semiconductor apparatus obtained by the method for growing nitride semiconductor of claim 22 by etching.

27. A method for producing a semiconductor apparatus, comprising:

eroding and removing a diboride single crystal substrate of a semiconductor apparatus obtained by the method for growing nitride semiconductor of claim 23 by etching.

28. A method for producing a semiconductor apparatus, comprising:

eroding and removing a diboride single crystal substrate of a semiconductor apparatus obtained by the method for growing nitride semiconductor of claim 24 by etching.

29. A method for producing a semiconductor apparatus, comprising the steps of:

carrying out crystal growth of a nitride semiconductor layer on one principal surface of a single crystal substrate of a hexagonal crystal symmetry having electrical conductivity; and

eroding and removing the single crystal substrate by

etching.

30. The method of claim 29, wherein the single crystal substrate is a substrate of a diboride single crystal expressed by XB_2, in which X includes at least one of Zr and Ti.

31. The method of claim 29, wherein in growing the nitride semiconductor layer from vapor phase, a nitride semiconductor layer grown firstly is an $Al_xGa_{1-x}N$ layer ($0 < x \leqq 1$).

32. The method of claim 29, wherein a mixed solution of at least nitric acid and hydrofluoric acid is used for the etching.